

MATH 104: WORKSHEET 11

1. Concepts

- (1) Optimization practice
- (2) Zero-sum game theory

2. Discussions

Problem 2.1. Find the points on the sphere $x^2 + y^2 + z^2 = 4$ that are closest to and farthest from the point $(1, 1, 1)$.

Problem 2.2. Problem 15 from <https://activecalculus.org/multi/S-10-8-Lagrange-Multipliers.html>.

Problem 2.3. Compute the Nash equilibrium for the 2-player game, where, the convention is for player A to receive from player B the amount of the corresponding entry of the matrix

$$P = \begin{pmatrix} -1 & 2 \\ 3 & -2 \end{pmatrix}$$

Problem 2.4. This is called the Mendelsohn game. Each player chooses 1, 2, or 3 simultaneously. If they get the same number, no one gets anything. If A is higher than B by 1, A loses 1 point. If A is higher than B by 2, A wins 2 points.

- (1) Write down the payoff matrix for A .
- (2) What is the Nash equilibrium?